

REMARKS

The pending Office Action addresses and rejects claims 1-8. Applicants respectfully request reconsideration in view of the remarks herein.

I. Claim Rejections Pursuant to 35 U.S.C. §103(a) – “Kimura & Takahashi”

Claims 1 and 5-6 are rejected pursuant to 35 U.S.C. §103(a) as being obvious over JP 01-215290 (“Kimura”) in view of U.S. Patent No. 4,581,939 (“Takahashi”). The Examiner argues that Kimura discloses the inventions of claims 1 and 6, except for providing a spherical focusing lens. *Office Action* at 2. The Examiner relies on Takahashi to teach this limitation, arguing that it would have been obvious to modify the device of Kimura in view of Takahashi. Applicants respectfully disagree.

A. Kimura Lacks a Vibrating Frame and No Motivation Exists to Modify It’s Frame to Vibrate

Claims 1 and 6 require a workpiece engaged by a first vibrating frame. Kimura is deficient with respect to each of these claims because it altogether lacks a *vibrating frame*.¹ Instead, the sample (3) of Kimura is fixed to a stage (6) that only moves according to precise instructions from a stage controller (7). *See Kimura* at 3-4; *Kimura Figs.* 1, 6. The stage controller (7) causes the stage (6) to move back and forth under a stationary laser beam (2) according to a desired cut pattern. *Id.* An outline detector (17) is provided to determine when the edge of the sample is reached and to instruct the stage controller (7) to reposition the stage (6) and sample (3). *Kimura* at 3-4. Thus, absent specific instruction from the stage controller, the Kimura stage does not move at all, much less vibrate as required by claims 1 and 6. The dictionary defines “vibration” as “a periodic motion of the particles of an elastic body or medium in alternately opposite directions from the position of equilibrium when that equilibrium has been disturbed...” *Webster’s Third New International Dictionary* (1993). The movement of the stage in Kimura, which only travels according to discrete

¹ In the Advisory Action dated 1/18/2008, the Examiner states that “Applicant argues that Kimura teaches a vibrating stage which is not the same as applicant’s vibrating frame.” This assertion is inaccurate in that Applicants have never characterized the stage of Kimura as “vibrating.” Rather, Applicants have consistently argued that the stage of Kimura does not vibrate at all. *See, e.g., Applicants’ Response dated 1/2/2008* at page 3.

and specific directions from a stage controller, certainly does not constitute “vibration.” Accordingly, Kimura fails to teach or even suggest an express limitation of the claimed invention.

In the Advisory Action dated January 18, 2008, the Examiner states that “close examination reveals that the vibrating stage [of Kimura] is the same as applicant’s vibrating frame.” Applicants contend that it was impossible for the Examiner to make a “close examination” of Kimura at the time the Advisory Action was issued because the Examiner had not yet obtained an English-language translation of the full reference and was instead relying only on a translated abstract. Reliance only on an abstract of a foreign language document, and not the underlying document itself, is generally inappropriate. *See MPEP* § 706.02(II). Regardless, the only language in Kimura that the Examiner could closely examine at the time of the Advisory Action was the Abstract, and the Abstract merely states that “the stage holding the sample is allowed to move.” Such language clearly cannot be interpreted to mean that the stage “vibrates,” which requires something more than simple movement as explained above.

Applicants also note that no skilled artisan would modify Kimura to include a vibrating frame since doing so would render Kimura’s device inoperable. In order to cut a pattern into a sample, without destroying the delicate living cell, Kimura relies on controlling the speed and movement of the frame with great precision. As explained above, movement is precisely controlled to cut around the edge of a sample. This is done to maintain viability of the living cells in the sample. Any vibration of the frame and/or workpiece would be *fatal* to the Kimura method, as this uncontrolled movement would risk damage to the cell. This is specifically contrary to the teachings of Kimura, as explained in the Problems to Be Solved By the Invention section. In particular, Kimura explains that prior art lasers kill living samples because the lasers only move in the X and Y direction, thus necessarily cutting through the spherical cells. To solve this problem, Kimura designed a system that detects the shape of the living cells and allows the laser to move in the Z direction to avoid cutting through the cells and instead to cut around the cells. Again, any vibration would prevent such precise controlled movement and would destroy the cells. Such a modification is therefore specifically contrary to the teachings of Kimura and would never be made by a person having ordinary skill in the art. This reason alone is sufficient to render claims 1 and 6, as well as claim 5 which depends therefrom, patentable over Kimura.

B. Kimura Lacks a Lens Mounted to the Same Frame as the Sample and No Motivation Exists to Add Such a Lens to Kimura

Kimura further fails to teach or suggest a lens mounted to the same frame as the sample, as further required by claims 1 and 6. Instead, the exact opposite is true – Kimura specifically requires that the sample and the lens be mounted to separate frames. This independent movement is illustrated in Figures 1 and 6 of Kimura, which show a sample (3) mounted to a stage (6) and an objective lens (1) and laser beam (2) held stationary above the stage. As explained in Kimura, movement of the stage (6) is controlled by a stage controller (7) and movement of the lens is controlled by a lens-moving controller (15) and lens-moving device (14). Thus, because the lens and sample of Kimura are mounted separately, Kimura lacks a lens mounted to the same frame as the sample, as required by claims 1 and 6.

Applicants further note that no person skilled in the art would modify the Kimura lens to be mounted to the same frame as the sample since doing so would render the device inoperable. It is a fundamental requirement of Kimura that the lens and sample not be mounted to the same frame, since such a configuration would prevent the sample from moving independently of the lens. As explained above, the whole purpose of Kimura is to move the sample relative to the lens and laser to cut the outline of a cell. If the sample were mounted to the same frame as the lens, as required by claims 1 and 6, the sample could only be cut at one distinct point. There is thus no motivation to modify Kimura to reach the claimed invention.

C. Neither Kimura Nor Takahashi Teach Drilling Holes

As conceded by the Examiner, Kimura fails to teach drilling holes. *Final Office Action dated 11/14/2007* at 2. Rather, as the stage (6) of Kimura is moved beneath a stationary laser (2), the laser (2) etches around three-dimensional cells suspended in a sample (3). *See Kimura* at 2-3; *Figures 2, 6*. As explained at page 2 of Kimura, the Kimura device is designed to remove material surrounding a generally spherical cell, such as a fertilized ovum, without damaging or killing the sample. Drilling a hole through the sample would be entirely contrary then to the purpose of Kimura, as it would destroy the delicate cell.

Takahashi fails to remedy this deficiency because it too lacks any teaching or suggestion of drilling holes in a work piece. Instead, Takahashi discloses a system for projecting light onto an object's surface in order to detect any internal flaws that may exist in the object. Moreover, there is no way to modify Kimura with Takahashi, or with any reference, to drill a hole while still maintaining its intended capability of cutting around a delicate, three-dimensional cell. A reference directed toward drilling holes does not provide any advantage when trying to carve living cells from a sample as in Kimura. In fact, one seeking to modify Kimura would want to ensure that the laser *doesn't* drill holes in the cell, since the entire purpose of Kimura is to avoid damage to the fragile living sample. Accordingly, both references cited by the Examiner fail to teach or suggest drilling holes in the work piece, and there is no motivation in Takahashi or in any other reference to modify Kimura to drill holes.

D. There is no Motivation to Modify Kimura with the Spherical Lens of Takahashi

The Examiner also concedes that Kimura fails to teach or suggest yet another limitation of claims 1 and 6 – a spherical lens. The Examiner relies on Takahashi to teach a spherical lens, but again, no motivation is provided to combine this reference with Kimura.

It is well settled that “the mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification.” *In re Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992). As explained at page 3 in Applicants’ Response dated January 2, 2008, Takahashi does not provide any teachings relating to the spherical lens that would motivate a skilled artisan to use such a lens with Kimura. Instead, Takahashi merely states that a spherical lens is used, without providing any advantages to doing so.

The Examiner further argues that the addition of a spherical lens to Kimura can be accomplished merely by rearranging parts. *Office Action* at 5. This argument fails, however, since the Examiner has already admitted that Kimura lacks components of the claimed invention. In other words, there is no way for the parts of Kimura to be rearranged to reach the claimed invention if

several parts are missing. Moreover, even in the case of a rearrangement some motivation is required:

“The mere fact that a worker in the art could rearrange the parts of the reference device to meet the terms of the claims on appeal is not by itself sufficient to support a finding of obviousness. The *prior art must provide a motivation or reason* for the worker in the art, without the benefit of appellant's specification, to make the necessary changes in the reference device.” Ex parte Chicago Rawhide Mfg. Co., 223 USPQ 351, 353 (Bd. Pat. App. & Inter. 1984).

MPEP § 2144.04(VI)(C) (emphasis added). Accordingly, since the Examiner has failed to identify even a shred of motivation to alter Kimura to include the spherical lens of Takahashi, the rejection based on these references is inappropriate.

E. Kimura is Non-Analogous Art

Lastly, it is inappropriate to rely on Kimura at all, as it is non-analogous art. To be analogous, a reference must either be within the field of the inventor's endeavor or be reasonably pertinent to the particular problem with which the inventor was involved. *In re Deminski*, 796 F.2d 436, 442 (Fed. Cir. 1986).

First, the Kimura method for shaping a three-dimensional living cell is clearly outside the field of drilling holes in a vibrating workpiece. The fact that Kimura and the present invention use lasers for cutting, as suggested by the Examiner, does not render Kimura analogous. The Examiner's reliance on such a broad interpretation of the field of Applicant's endeavor is improper. Second, Kimura is not reasonably pertinent to the particular problem with which Applicants were involved. The problem being solved is not simply a biological problem, as suggested by the Examiner, rather the purpose of the claimed method is drilling precise holes in a vibrating workpiece without subjecting the drilling laser to vibration. *Specification* at 2. The purpose of Kimura on the other hand is to cut around three-dimensional living cells without destroying them. *Kimura* at 2. This is a vastly different problem than drilling precise holes in a workpiece. A reference is reasonably pertinent if it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem. *In re Clay*, 966 F.2d 656, 659 (Fed. Cir. 1992). Because Kimura is directed to a entirely different purpose than the claimed

invention, no inventor would be motivated to consider Kimura because it is simply not relevant to solving the purpose of the claimed invention. *See id.* Accordingly, Kimura is non-analogous art and reliance thereon is inappropriate.

In sum, Kimura is deficient with respect to at least four limitations of claims 1 and 6, none of which is adequately addressed by the secondary reference cited by the Examiner. Moreover, Kimura is non-analogous art, and as such cannot be relied upon to reject the claimed invention as obvious. Accordingly, claims 1 and 6 are not obvious over Kimura or Takahashi, taken alone or in combination. Claim 5 is not obvious at least because it depends claim 1.

II. Claim Rejections Pursuant to 35 U.S.C. §103(a) – “Bosch, Hillier, & Takahashi”

A. The Examiner’s Rejection and the Scope and Content of the Prior Art

1. Bosch

Bosch discloses a laser fuel injector drill. As shown in Figure 1 of Bosch, a plurality of laser beams (6) are focused through a lens (8) onto a workpiece (1), forming a bore (2) therein. The workpiece is positioned on a holder (3) that is rotated about the central axis of the bore (2) by a motor (22). *Bosch* at FIG. 1. The holder (3) also oscillates up and down in the direction of the illustrated arrow (18) at an ultrasonic frequency. *Id.*

2. Hillier

Hillier teaches an electron microscope where the specimen cartridge fits into a recess formed in the objective lens. *Hillier* at FIG. 1. In Hillier, an electron beam (27) is directed first through a specimen (25) and then through an objective lens (4). *Id.* The beam then travels through a central aperture (12) in an exit pole (10), at which point it can be viewed as a magnified image of the specimen (25). *Id.* When external vibration is applied, the lens (4) and the specimen (25) of Hillier vibrate substantially in unison because the specimen (25) in Hillier is situated within and supported only by a recess in the objective lens (4). *Hillier* at FIG. 1; col. 4, lns. 41-49.

3. *The Rejection*

Claims 1 and 5-6 are rejected pursuant to 35 U.S.C. §103(a) as being obvious over DE 3938779 (“Bosch”), in view of U.S. Patent No. 2,496,051 (“Hillier”) and further in view of U.S. Patent No. 4,581,939 (“Takahashi”).

Independent claims 1 and 6 recite a method and apparatus for laser drilling a vibrating workpiece. Both claims require a workpiece and a spherical focusing lens that are each mounted to a first vibrating frame, such that the spherical lens, the workpiece, and the frame vibrate substantially in unison. The Examiner argues that Bosch teaches drilling holes in a vibrating workpiece, that Hillier teaches providing a work piece and a lens that vibrate substantially in unison with a first vibrating frame, and that Takahashi teaches a spherical lens. *Office Action* at 3. The Examiner argues that it would have been obvious to modify Bosch with the teachings of Hillier and Takahashi to arrive at the claimed invention. *Id.* Applicants respectfully disagree.

B. Arguments

1. *No Motivation Exists to Combine the Unitary Lens/Stage of Hillier with Bosch*

“The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious.” MPEP § 2141(III). The Supreme Court in *KSR Int’l Corp. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1741 (2007), quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006), stated that “rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” Here, the only reasoning the Examiner has provided for combining the lens/stage arrangement of Hillier with the fuel injector drill of Bosch is to “minimize machining errors due to drift.” This argument fails, however, because Bosch is already effective to eliminate drift-related machining errors. In fact, this is the exact reason why the Bosch workpiece is rotated and ultrasonically oscillated up and down during the drilling operation – to achieve a uniform bore hole in the workpiece. *See Bosch* at col. 1; Ins. 6-57. Moreover, modifying the Bosch drill to have a unitary lens/workpiece holder as taught by Hillier would counteract this feature. If the lens and workpiece of Bosch

were to move in unison as taught by Hillier, the rotation and oscillation of the workpiece would be negated by the identical rotation and oscillation of the lens, resulting in a bore hole that is no more uniform than had the lens and workpiece both been stationary.

In sum, Bosch is already effective in reducing machining errors due to drift because it already includes a mechanism for rotating and oscillating the workpiece with respect to the laser beam. Moreover, even if Bosch could benefit from the Examiner's proposed combination, the combination would actually increase machining errors and distortion of the bore hole. Accordingly, no skilled artisan would have been motivated to combine the teachings of Bosch and Hillier to reach the inventions of claims 1 and 6.

2. The Examiner's Proposed Combination is Impossible

Furthermore, it would have been impossible to incorporate the unitary lens/sample holder (4, 25) of Hillier with the apparatus of Bosch because in Hillier, the beam passes through the sample *before* passing through the lens. Such a configuration would render the Bosch apparatus useless, as the multiple laser beams (6) would not be focused to a single point until *after* passing through the workpiece (it is not until the Bosch beams (6) pass through the lens (8) that they are focused to a single point). Put differently, the only way to modify Bosch to include the Hillier teaching of the sample and the lens vibrating in unison would be to put the workpiece (1) of Bosch between the laser (5) and the top of the lens (8). If this is done, however, the laser beams (6) of Bosch will hit the workpiece (1) before being focused on the target drilling site by the lens (8), thereby producing multiple holes in the workpiece. This result is unacceptable in Bosch, where a single, perfectly uniform hole is desired.

Accordingly, it is not possible to combine the teachings of Bosch and Hillier as suggested by the Examiner to reach the inventions of claims 1 and 6.

3. No Motivation Exists to Combine the Spherical Lens of Takahashi with Bosch

The Examiner relies on Takahashi to teach a spherical lens, but no motivation is provided to combine this reference with Bosch and/or Hillier other than that to do so would be an obvious

rearrangement of parts.

As explained above, “the mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification.” *In re Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992). Takahashi does not provide any teachings relating to the spherical lens that would motivate a skilled artisan to use such a lens with Bosch or any other reference. Instead, Takahashi merely states that a spherical lens is used, without providing any advantages to doing so.

Moreover, even in the case of a rearrangement some motivation is required:

“The mere fact that a worker in the art could rearrange the parts of the reference device to meet the terms of the claims on appeal is not by itself sufficient to support a finding of obviousness. The *prior art must provide a motivation or reason* for the worker in the art, without the benefit of appellant's specification, to make the necessary changes in the reference device.” Ex parte Chicago Rawhide Mfg. Co., 223 USPQ 351, 353 (Bd. Pat. App. & Inter. 1984).

MPEP § 2144.04(VI)(C) (emphasis added). Accordingly, since the Examiner has failed to identify even a shred of motivation to alter Bosch to include the spherical lens of Takahashi, the rejection based on these references is inappropriate.

Consequently, independent claims 1 and 6 are not obvious over Bosch, Hillier, or Takahashi, taken alone or in combination. Claims 1 and 6 therefore represent allowable subject matter and claim 5 is likewise allowable at least because it depends from an allowable base claim.

III. Dependent Claim Rejections Pursuant to 35 U.S.C. §103(a)

Claims 2-4 and 7-8 are rejected pursuant to 35 U.S.C. §103(a) as being obvious over Kimura in view of Takahashi and further in view of U.S. Patent No. 6,252,195 (“Mosavi”). Claims 2-4 and 7-8 are also rejected pursuant to 35 U.S.C. §103(a) as being obvious over Bosch in view of Hillier and further in view of Takahashi and further in view of Mosavi.

Mosavi is merely relied upon to teach discrete features recited in the dependent claims, and does not remedy the deficiencies of Kimura and Bosch discussed above with respect to the independent claims. Claims 2-4 and 7-8 are therefore non-obvious and allowable at least because


they depend from allowable base claims.

IV. Conclusion

Accordingly, all pending claims are now in condition for allowance, and allowance thereof is respectfully requested. The Examiner is encouraged to telephone the undersigned attorney for Applicants if such communication is deemed to expedite prosecution of this application.

Respectfully submitted,

Date: September 29, 2008



Lisa Adams, Reg. No. 44,238
Attorney for Applicant(s)

Nutter McClennen & Fish LLP
World Trade Center West
155 Seaport Boulevard
Boston, MA 02110
Tel: (617) 439-2550
Fax: (617) 310-9550

1768980.1